

CLAIMS

1. A continuous contacting apparatus for separating a liquid component from a liquid mixture, the apparatus comprising:

5 a first chamber having first and second ends, an inlet and an outlet for a carrier gas, and an inlet and an outlet for a liquid mixture,

wherein the inlet for the liquid mixture is located between the first and second ends, the outlet for the liquid mixture and the inlet for the carrier gas are located at the second end of the first chamber, and the outlet for the carrier gas is located at the first
10 end;

a second chamber having first and second ends, an inlet and an outlet for a carrier gas, and an inlet and outlet for the separable liquid component,

wherein the inlet for the carrier gas and the inlet for the liquid component are located at the first end of the second chamber, and the outlet for the carrier gas and the
15 outlet for the separable liquid component is located at the second end of the second chamber; and

a common heat transfer wall capable of providing thermal communication between the first chamber and the second chamber.

20 2. The apparatus of claim 1, wherein the inlet for the liquid mixture is located about the middle of first and second ends of the first chamber; wherein the inlet for the carrier gas and the inlet for the liquid component at the first end of the second chamber is a single common inlet; and wherein one outlet located at the second end of the second chamber is used as the outlet for the carrier gas and the outlet for the separable liquid
25 component.

3. The apparatus of either claims 1 or 2 further comprising,

a first heat exchanger having a cooling chamber with an inlet and an outlet in thermal communication with a heating chamber with an inlet and an outlet, wherein the
30 inlet of the cooling chamber is connected to the outlet for the carrier gas of the first chamber and the outlet of the cooling chamber is connected to the inlet for the carrier gas of the second chamber; and

a second heat exchanger having a cooling chamber with an inlet and an outlet in thermal communication with a heating chamber with an inlet and an outlet, wherein the inlet of the cooling chamber is connected to the outlet for the carrier gas of the second chamber and the outlet of the cooling chamber is connected to the inlet for the carrier gas
5 of the first chamber.

4. The apparatus of claim 3 further comprising,
a feeding device for providing the liquid mixture onto the first chamber side of the heat transfer wall; and
10 a mover for providing a flow of a carrier gas through the chambers, wherein the gas flow in the first chamber is countercurrent to the gas flow in the second chamber.

5. The apparatus of claim 4 further comprising,
a heating apparatus for heating at least a portion of the carrier gas from the second
15 chamber, wherein the carrier gas is removed from the second chamber at about the corresponding location from the inlet for the liquid mixture in the first chamber and returned to the second chamber at a location between the location of removal and the second end of the second chamber.

20 6. The apparatus of claim 1, further comprising a plurality of spacers placed in at least one chamber.

7. The apparatus of claim 6, wherein the plurality of spacers are positioned to provide a serpentine-shaped channel for the carrier gas.
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8. The apparatus of claim 7 further comprising airflow guides.

9. The apparatus of claim 8, wherein only the second chamber has the plurality of spacers and airflow guides.
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10. The apparatus of either claims 1 or 2, wherein the first chamber is centrally located and the second chamber wraps around the first chamber in a helix shape.

11. The apparatus of claim 10 wherein the inlet for the liquid mixture is located at the first end of the first chamber.

12. A continuous contacting apparatus for exchanging heat released by a desiccant, the apparatus comprising

5 a heat-releasing chamber having an inlet and an outlet for a gas at least partially saturated with a component absorbable by a desiccant, and an inlet and an outlet for a desiccant;

a heat-absorbing chamber having an inlet and an outlet for a gas to be heated;

10 a common heat transfer wall capable of providing thermal communication between the heat-releasing chamber and the heat producing chamber; and

a desiccant regenerator having an inlet and an outlet, wherein the outlet provides a regenerated desiccant stream to the desiccant inlet of the heat-releasing chamber, and wherein the inlet receives spent desiccant stream from the desiccant outlet of the heat-

15 releasing chamber.

13. The apparatus of claim 12, wherein the desiccant inlet of the heat-releasing chamber is situated to place the desiccant onto the heat-releasing side of the heat transfer wall.

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14. The apparatus of claim 12 further comprising an inlet and an outlet in the heat-absorbing chamber for a liquid having a component evaporable into the gas.

15. The apparatus of claim 14, wherein the inlet for the liquid having the evaporable component is situated to place the liquid onto the heat-absorbing side of the heat transfer wall.

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16. The apparatus of claim 12, wherein the desiccant regenerator applies heat to the spent desiccant for regeneration.

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17. The apparatus of claim 12, wherein the desiccant regenerator contacts the spent desiccant with heated air for regeneration.

18. The apparatus of claim 12, wherein the desiccant regenerator contacts the spent desiccant with ambient air for regeneration.

19. The apparatus of either claim 17 or claim 18 further comprising a heat
5 exchanger situated between the heat releasing chamber and the desiccant regenerated, the heat exchanger transferring heat from the spent desiccant stream to the regenerated desiccant stream.

20. The apparatus of claim 12, wherein the desiccant is selected from the group
10 consisting of lithium bromide, calcium chloride, lithium chloride, and mixtures thereof.